

CLAIMS

- 1 1. A photonic bandgap microcavity comprising:
 - 2 a membrane structure that can experience strain; and
 - 3 a photonic bandgap waveguide element formed on said membrane structure
 - 4 having a defect so that when said membrane structure is strained, said photonic bandgap
 - 5 waveguide element is tuned to a selective amount.

- 1 2. The photonic bandgap microcavity of claim 1, wherein said membrane structure
2 comprises a sub-micron SiO₂ layer.

- 1 3. The photonic bandgap microcavity of claim 1, wherein said photonic bandgap
2 waveguide element comprises a 1-dimensional photonic crystal.

- 1 4. The photonic bandgap microcavity of claim 3, wherein said photonic bandgap
2 waveguide element comprises a plurality of periodic holes.

- 1 5. The photonic bandgap microcavity of claim 4, wherein said defect breaks the
2 periodicity of said periodic holes.

- 1 6. The photonic bandgap microcavity of claim 1, wherein said selective amount
2 comprises approximately 1%.

- 1 7. The photonic bandgap microcavity of claim 1 further comprising at least one actuator
2 that is coupled to said membrane so as to produce said strain.

- 1 8. The photonic bandgap microcavity of claim 7, wherein said at least one actuator
2 produces strain on said membrane between 0.2 and 0.3%.

- 1 9. The photonic bandgap microcavity of claim 7, wherein said at least one actuator
- 2 comprises a top electrode.

- 1 10. The photonic bandgap microcavity of claim 9, wherein said at least one actuator
- 2 comprises a bottom electrode.

- 1 11. The photonic bandgap microcavity of claim 7, wherein said at least one actuator
- 2 comprises a PZT piezoelectric actuator.

- 1 12. A method of forming a photonic bandgap microcavity comprising:
 - 2 providing a membrane structure that can experience strain; and
 - 3 forming a photonic bandgap waveguide element on said membrane structure
 - 4 having a defect so that when said membrane structure is strained, said photonic bandgap
 - 5 waveguide element is tuned to a selective amount.

- 1 13. The method of claim 12, wherein said membrane structure comprises a sub-micron
- 2 SiO₂ layer.

- 1 14. The method of claim 12, wherein said photonic bandgap waveguide element
- 2 comprises a 1-dimensional photonic crystal.

- 1 15. The method of claim 14, wherein said photonic bandgap waveguide element
- 2 comprises a plurality of periodic holes.

- 1 16. The method of claim 15, wherein said defect breaks the periodicity of said periodic
- 2 holes.

1 17. The method of claim 12, wherein said selective amount comprises approximately
2 1%.

1 18. The method of claim 12 further comprising providing at least one actuator that is
2 coupled to said membrane so as to produce said strain.

1 19. The method of claim 7, wherein said at least one actuator produces strain on said
2 membrane between 0.2 and 0.3%.

1 20. The method of claim 7, wherein said at least one actuator comprises a top electrode.

1 21. The method of claim 9, wherein said at least one actuator comprises a bottom
2 electrode.

1 22. The method of claim 7, wherein said at least one actuator comprises a PZT
2 piezoelectric actuator.